Amendments to the Drawings:

Replacement sheets for FIG. 7 and FIG. 20 are enclosed. Two errors in the legend have been corrected in FIG. 7. In the legend, legend "B" is now correctly identified as "D" (the 85%/15% Slope) while legend "D" is correctly identified as "B" (the 95%/5% Slope).

With respect to FIG. 20, boxes 605 and 615 have been added. No new matter has been introduced into the application as a result of this amendment. Support for this amendment can be found in Applicant's specification on page 9, lines 16-29, on page 10, lines 18-28, and in the originally-filed claims 2, 6, 11, and 15.

Approval by the Examiner is respectfully requested.

REMARKS

Claim18 has been amended. Claims 1-9, 11, and 13 have been cancelled without prejudice. Claims 10, 12 and 14-22 are currently pending in the application.

The Examiner rejected claims 10, 12, 14-15, 17, and 19-22 under 35 U.S.C. § 103(a) as being unpatentable over Komiya (USPN 5,335,075) in view of Sayag (USPN 5,055,667) and Bryant (USPN 6,249,358). The Examiner rejected claims 16 and 18 under 35 U.S.C. § 103(a) as being unpatentable over Komiya in view of Sayag, Bryant, and Juen (USPN 5,341,220).

Komiya, Sayag, and Bryant

Applicant's claimed invention in independent claims 10 and 19 extends the dynamic range of an image sensor by altering the charge capacity of a pixel while the pixel is integrating charge and reduces fixed pattern noise by multiplying each pixel by a constant value determined for that pixel to compensate for variations of the charge capacity such that all pixel photo response curves are substantially equal. None of the references cited by the Examiner, when combined, teach or suggest each and every element in claims 10 and 19. In particular, none of the references, either individually or in combination, disclose or suggest "multiplying each pixel by a constant value determined for that pixel to compensate for variations of the charge capacity such that all pixel photo response curves are substantially equal."

The Examiner argues on page 4 of the office action that it would have been obvious to one of ordinary skill in the art to combine Komiya and Sayag because "the function of maximum acceptable charge level can be mathematically determined and electronically generated on the chip so as to achieve a compression of the dynamic range in an arbitrarily chosen manner, thus the potential at the output of the device is directly proportional to the charge transferred to the transport gate." The Examiner further argues it would have been obvious to one of ordinary skill in the art to include Bryant in order to enable the pixel to pixel variations to create "a system response which may be measured

and compensated by applying offsets to correct for variations in dark signal level and gains to correct for variations in illumination and pixel responsiveness." None of these motivations cited by the Examiner address the issue of reducing or eliminating fixed pattern noise by multiplying each pixel by a constant value determined for that pixel to compensate for variations of the charge capacity such that all pixel photo response curves are substantially equal. None of the references cited by the Examiner teach or suggest reducing fixed pattern noise with this technique.

The Examiner argues Bryant discloses "multiplying each pixel by a constant value determined for that pixel to compensate for variations of the charge capacity such that all pixel photo response curves are substantially equal" by multiplying the previously offset-corrected scan data with a gain factor so that the resulting system response will be uniform. Applicant respectfully submits this aspect of Bryant does not teach or suggest "multiplying each pixel by a constant value determined for that pixel to compensate for variations of the charge capacity such that all pixel photo response curves are substantially equal." Bryant is correcting for pixel to pixel variations in system response in a multi-pixel scanner array used to scan photographic film images. Bryant initially applies offsets to correct for variations in dark signal levels and then applies gains to correct for variations in illumination and pixel responsiveness (col. 5, lines 1-9). Nothing found in Bryant teaches or suggests "multiplying each pixel by a constant value determined for that pixel to compensate for variations of the charge capacity such that all pixel photo response curves are substantially equal.

Applicant further respectfully disagrees with the Examiner's argument that Komiya teaches a charge control structure in the condition setting circuit 64, and that circuit 62 changes the charge capacity during an integration time. The Examiner cites the description in lines 27-54 in column 12. Lines 40-54 in column 12 state:

> The pre-photometry circuit 74 detects the maximum value Lh and minimum value L1 of the input signal and supplies these values to the condition setting circuit 64.

> The condition setting circuit 64 judges whether or not the maximum value Lh is saturated, and shortens the exposure time T or makes the diaphragm opening wider when it is saturated. When the maximum value Lh is not saturated, the exposure time T is made longer or the diaphragm opening narrower. This action is performed each time the signal is read from the CMD 39.

Thus, Komiya expressly teaches varying the exposure time T or varying the size of the diaphragm opening to vary the number of charge carriers a pixel generates during an integration time. These techniques in Komiya do not affect the *charge capacity* of a pixel. Nothing found in Komiya teaches or suggests varying the *charge capacity* of a pixel during an integration time. Figure 6c in Applicant's application illustrates the variation of the *charge capacity* of a pixel. In figure 6c, the charge capacity of a photodiode is increased to 40,000 electrons by lowering the substrate voltage (see page 7, lines 4-17 on page 7 of Applicant's specification).

Based on the foregoing, Applicant respectfully submits that the combined references do not teach or suggest "multiplying each pixel by a constant value determined for that pixel to compensate for variations of the charge capacity such that all pixel photo response curves are substantially equal." Therefore, for at least the following reasons, the combination of Komiya, Bryant, and Sayag does not render Applicant's independent claims 10 and 19 obvious because the combinations do not teach or suggest all of the claim limitations.

"If an independent claim is not rendered obvious by prior art, then any claim depending from the independent claim is not obvious." In re Fine, 5 USPQ2d 1596 (Fed. Cir. 1988) (see also M.P.E.P. § 2143.03). Claims 12, 14, 15, and 17 depend from independent claim 1, while claims 20-22 depend from independent claim 19. Since the combinations of Komiya, Bryant, and Sayag does not render independent claims 10 and 19 obvious, dependent claims 12, 14, 15, 17, and 20-22 are also not obvious in view of Komiya, Bryant, and Sayag.

Komiya, Sayag, Bryant, and Juen

Applicant's arguments with respect to Komiya, Sayag, and Bryant apply to this rejection as well. The combination does not teach or suggest each and every element in claims 10 and 19. In particular, none of the references, either individually or in combination, disclose or suggest "multiplying each pixel by a constant value determined for that pixel to compensate for variations of the charge capacity such that all pixel photo response curves are substantially equal."

And Juen does not make up for the deficiencies of Komiya, Sayag, and Bryant. The Examiner argues Juen teaches a capacity control structure in its vertical overflow drain structure that is "adjusted to produce the desired photo response curve substantially entirely within the duration of a flash lamp exposure." Firstly, a vertical overflow drain is not a capacity control structure as claimed by Applicant. A vertical overflow drain does not change the charge capacity of a pixel, and it does not change the charge capacity throughout the integration time such that substantially no portion of the pixel photo response curve is substantially linear.

Additionally, the vertical overflow drain in Juen is described as "capable of performing an electronic shuttering operation under the control of a drive circuit 7." Juen states the "imaging device 3 concurrently serves as a photometer device whereby when an image of an object is focused on the photosensitive section of the device with the driving by the drive circuit 7 being stopped altogether or in a completely stopped condition where no bias voltage is applied to the device, the photo current flowing into the overflow drain from groups of photodiodes forming the device photosensitive section in accordance with the light quantity of the object is taken out as a measured light quantity signal from the semiconductor substrate of the imaging device 3 and it is measured by a photometer amplifier 4" (col. 6, lines 42-59). Applicant respectfully submits this description does not teach or suggest a capacity control structure that is adjusted to produce a desired photo response curve substantially entirely within the duration of a flash lamp exposure.

To support the argument regarding Juen, the Examiner cites the description in column 8, line 64 to column 9, line 13 as support for this position. This description, however, states the following:

> Also, when the system control circuit 8 receives a minimum opening signal, the control information read from the internal memory in correspondence to the initially assumed shutter speed is changed to control information corresponding to another shutter speed of a shorter time period. When this occurs, an indication of the new shutter speed is made within the finder picture area which is not shown and the feedback control of the aperture stop mechanism 2 through the photometer amplifier 4 and the aperture stop drive circuit 5 is again started in accordance with the new light quantity reference value in the selected control information, thereby performing the similar auto-iris operation. In this case, if the shutter speed becomes shorter than a predetermined shortest time period, the flash light unit 13 is made ready to emit light and it is prepared to provide an auxiliary illumination during the immediately following imaging operation.

Applicant respectfully submits nothing in the description, or anywhere else in Juen, teaches or suggests a capacity control structure that change the charge capacity throughout the integration time such that substantially no portion of the pixel photo response curve is substantially linear. Juen also does not disclose or suggest "the capacity control structure is adjusted to produce the desired photo response curve substantially entirely within the duration of a flash lamp exposure."

Based on the foregoing, Applicant respectfully submits that the combined references do not teach or suggest all of the limitations in independent claims 10 and 19. Therefore, for at least the following reasons, the combination of Komiya, Bryant, Sayag, and Juen does not render Applicant's independent claims 10 and 19 obvious.

"If an independent claim is not rendered obvious by prior art, then any claim depending from the independent claim is not obvious." In re Fine, 5 USPQ2d 1596 (Fed. Cir. 1988) (see also M.P.E.P. § 2143.03). Claims 16 and 18 depend from independent claim 1. Since the combinations of Komiya, Bryant, Sayag, and Juen does not render independent claim 10 obvious, dependent claims 16 and 18 are also not obvious in view of Komiya, Bryant, Sayag, and Juen.

In view of the foregoing it is respectfully submitted that the claims in their present form are in condition for allowance and such action is respectfully requested.

Respectfully submitted,

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If the Examiner is unable to reach the Applicant(s) Attorney at the telephone number provided, the Examiner is requested to communicate with Eastman Kodak Company Patent Operations at (585) 477-4656.